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INFORMAL REPORT

CRUSTAL STRUCTURE OF THE
INDONESIAN AREA

NOVEMBER 1968

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INFORMAL REPORT

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ABSTRACT

Three crustal types exist within this area as shown by the accompanying profiles: a continental type north of the island arc system, an oceanic type south of the Java Trench, and a transitional type between.

This Informal Report was prepared by the Geology Section, Environment Branch, Oceanographic Analysis Division.

This manuscript has been reviewed and is approved for release as an UNCLASSIFIED Informal Report.


H.W. DUBACH
Division Director

A. General

A continental-type crust probably underlies the entire region north of the Indonesian Island Arc System and between this island arc system and Australia, east of approximately 120°E. Between the islands and the Java Trench is a zone of transition from continental- to oceanic-type crust. The exact nature of this transition zone could not be determined from available data, but presumably it is similar to that which typically exists within the continental margin province. An oceanic-type crust exists south of the Java Trench and west of approximately 120°E.

Seven profiles show the thickness and composition of various layers of the earth's crust based on seismic reflection and refraction, and magnetic data in particular regions (See Figure).

Four crustal layers, each of which has a typical seismic velocity range and corresponding lithologic character, can be distinguished; however, none of the profiles shows all four layers. The average velocity of seismic compressional waves has been indicated on the profiles where known, and a typical range of average seismic velocities for each layer appears in the legend. The mantle is separated from the crust by the Mohorovičić Discontinuity, which is identified in only one profile (5).

B. Profiles

Five profiles show the layering in the crust of the outer or intermediate arcs of the Indonesian Island Arc System. Profile 1 is a short seismic refraction profile located on the southwestern slope of the Java Trench, not far from its axis. Profiles 2 and 3 are based on seismic reflection data and extend across the trench. The layer of unconsolidated sediments beneath the water mass varies in thickness from about 1.3 km. on the ridges to over 1 km. in the trough. Beneath the unconsolidated sediments lies a layer of consolidated (lithified) sediments of variable thickness. The consolidated sediment layer is missing under the edge of the Cocos Basin south of the trench, where the unconsolidated sediments lie directly on a buried basaltic ridge.

Profile 4 is based on seismic reflection data and extends across the Java Trench off Bali. In this profile, the thickness of the unconsolidated sediment layer averages about 0.3 km. under the ridges and trench and about 1.0 km. under Lombok Basin. The consolidated sediments, however, are thicker under the ridges than under the basin and trench, and the greatest thicknesses of the entire sediment layer (about 1.6 km.) occur in the Lombok Basin and Christmas Rise. Basaltic (oceanic-type) rock lies directly beneath the sedimentary layers and is of unmeasured thickness except in Profile 5, where it is

about 6.5 to 10.0 km. thick.

Profile 5, a refraction profile, does not distinguish between unconsolidated and consolidated sediments and is the only profile which reaches the mantle. The mantle is about 7 km. below the sea bottom on the Christmas Rise and 10 km. below in the Java Trench, but about 20 km. below the land surface on Lombok. A transition between typical oceanic-type crust and continental-type (granitic) crust exists under the Java Ridge and Lombok Basin.

Profiles 6-a and 6-b are based on seismic reflection data. They cross sediment-filled valleys off the east coast of Belitung. In these profiles, the crust is composed of sedimentary rocks, which have been intruded by igneous rocks. The overlying sediment layer consists of 3 to 5 meters of unconsolidated sediments underlain by up to 15 meters of consolidated sediments.

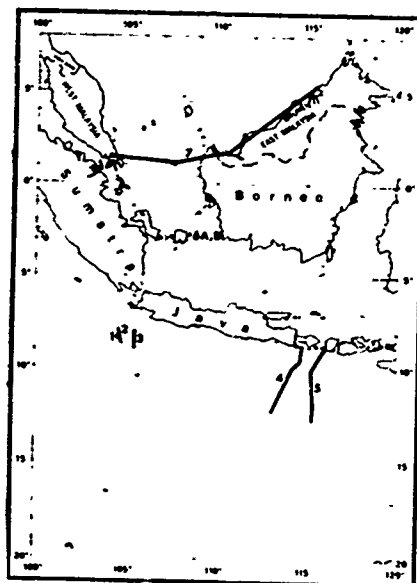
Profile 7 is based on magnetic and gravity data combined with geologic and stratigraphic information concerning local outcrops. The sediment layer is underlain by a continental-type crust, consisting of acidic, intermediate, and basic igneous rocks and metamorphosed sediments. These crystalline rocks are at or near the surface of the sea bed under Singapore Strait and most of Karimata Strait; however, in a small sedimentary basin west of Pulau-Pulau Tambelan the overlying sediments reach a thickness of approximately 0.6 km. Under the South China Sea, the sediment layer thickens to about 3.0 km.

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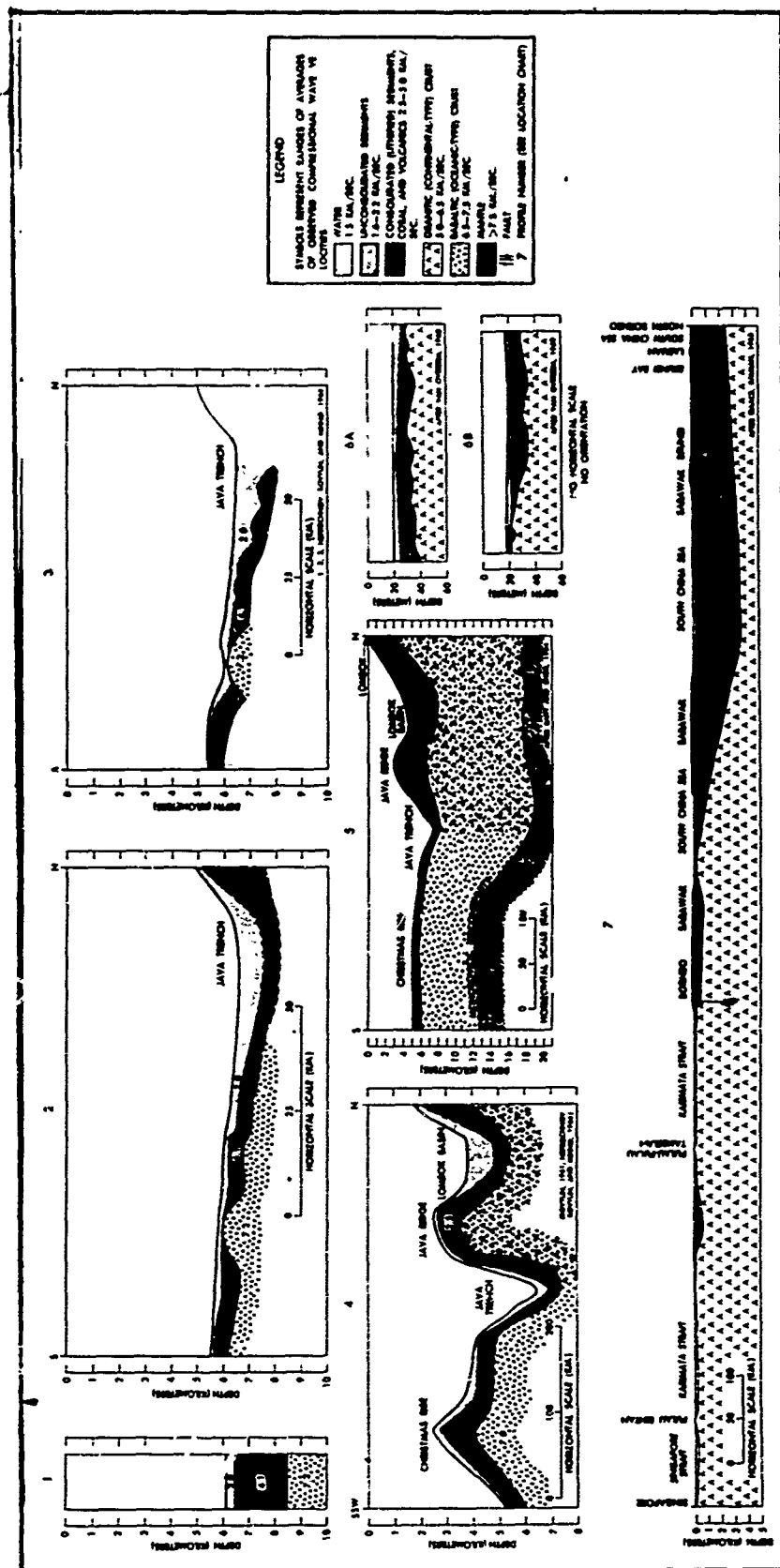
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Location Chart.



Profile of the earth's crust based on seismic, gravity, and magnetic data

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